

REUSABLE CONTAINERS

Project No. NT003-016

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REUSABLE CONTAINERS

Project NT003016(j)
Subproject SE52-67
Letter Report No. 2.50591
20 October 1955

Date released: 20 December 1955

Distribution: In accordance with the attached approved distribution list.

Remarks: Data, discussions and recommendations appearing herein have been technically reviewed and the report is released. They are not to be construed as indicating current or future operating policy of the Bureau of Supplies and Accounts or of the Navy Department. This report presents work in the area which has been performed primarily as the result of the pre-determined requirements; it is hoped that it will stimulate thought and action. Comment is invited and should be addressed to:

Chief, Bureau of Supplies and Accounts (W)
Navy Department
Washington 25, D. C.

/s/ Joel D. Parks
JOEL D. PARKS
Deputy and Assistant Chief of Bureau

20 October 1955

REUSABLE CONTAINERS - LETTER REPORT NO. 2.50591

Ref: (a) Research and Development Authorization SE52-67,
Project No. NTOO3-016(j), Reusable Containers;
development of
(b) CONF USNSRDF Report No. 2.202024 dtd 30 Apr 1955,
"Containers for Submarine Use"

Encl: (1) Photos and information on lightweight air cargo containers,
general purpose shipping containers, bins, and tote boxes

1. Reference (a) requested this Facility to design and investigate reusable containers fabricated of metal or other materials. The containers were to be splash-proof and capable of being handled by one man when loaded. Later discussions with BUSANDA (W) representatives modified weight specifications and otherwise changed original project requirements.

2. Reference (b) has been completed and submitted to BUSANDA for approval. That report covers a number of containers which could be used under the specifications outlined in paragraph 1. Although some containers do not entirely meet waterproof requirements for submarine use, they do meet the splash-proof, weight and size requirements of this project. Drawings and sources of supply of reusable containers of approximately 1-1/2 cu. ft. capacity are included in reference (b), and it is recommended that they be used as a guide for procurement of suitable reusable containers falling into this capacity category.

3. In view of the material covered in reference (b) and to avoid duplication, this report deals with various types of reusable containers of larger sizes than those originally considered. However, these containers cannot be handled by one man, and are described for information only. They are suitable for specific applications, but their over-all value to the supply system has not been determined. Some of these containers may be used for general cargo, while others are specially designed for transporting liquids and/or granular materials. The lack of definite field requirements for these containers made evaluation difficult. Should a specific problem arise, however, where a reusable container is required, suitable containers could be tested and evaluated. Photographs and general information concerning the containers investigated are included in enclosure (1). Each container was considered individually, and comparisons were not made as to utility, rough handling, impact resistance, etc. Two charts (Drawing Nos. SED-580 and SED-581), however, are included in this report, indicating the ratios of tare weight versus usable cube and tare weight versus gross cube. Since the number of points used in the formation of these charts was somewhat limited, it might be said that they actually represent trends rather than well defined charts. Additional information on these containers will be supplied upon request.

20 October 1955

4. In general, reusable containers fall into two main types:

- a. Collapsible
- b. Rigid

Each of these two main types are divided into three groups:

- (1) Lightweight containers for air cargo
- (2) General purpose (shipping containers)
- (3) Tote boxes or bins

5. Lightweight reusable containers were investigated and reported upon in Engineering Report No. 2.9012, "Packaging Developments for Air Cargo", dated 21 April 1953. The more prominent containers are included in this report.

6. A number of general purpose shipping containers from 75 to 275 cu. ft. capacity are available and have been investigated under Project No. SE54-102, "Unit Load Shipping Containers". Photographs and basic information on containers of various capacities in this category are included in enclosure (1). Two USNSRDF reports completed under Project No. SE54-102 are as follows:

- a. Report No. 2.2020254, "Household Effects Shipping Containers", dated 1 July 1952.

- b. Report No. 2.20202551, "Interim Analysis Report Relative to Standardization of Army and Navy Unit Load Shipping Containers", dated 14 November 1952.

7. A few of the containers covered in this report have, as a result of extensive investigation, been included in the Naval supply system. However, insufficient information is available to this Facility to indicate the application of the remainder for use in the system on a scale large enough to warrant a detailed evaluation.

8. In view of the above, it is recommended that upon receipt and acceptance of this report, this project be considered completed.

9. The inclusion of data, photographs, etc. of items of different manufacturers should not be construed as a Navy endorsement or recommendation for such items. It is realized that the listing is not complete, but is merely indicative of the items which have been readily available to this Facility and which are representative of typical constructions.

LIGHTWEIGHT AIR CARGO CONTAINERS

A. Description: Aluminum faced honeycomb container, collapsible, hinged cover, pallet box type.
Manufacturer: Douglas Aircraft Corporation.
Use: Air cargo - low and medium density.
External Dimensions: 65" x 42" x 35" high
Collapsed Dimensions: 64-1/2" x 41-1/2" x 7"
Tare Weight: 83 lbs.
Gross Cube: 52.7 cu. ft.
Usable Cube: 43.3 cu. ft.
Collapsed Cube: 18.7 cu. ft.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 1.58 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 1.92 \text{ lbs./cu. ft.}$



Fig. 1. - Container in Partially Open Position. NERDF Neg. No. 114-17.

B. Description: Paper faced honeycomb container, collapsible,
telescoping cover, pallet box type.
Manufacturer: Union Bag and Paper Company.
Use: Air cargo - low and medium density.
External Dimensions (cover extended): 52" x 41-3/4" x 65"
Collapsed Dimensions (cover extended): 52" x 41-3/4" x 13" high
Tare Weight: 135 lbs.
Gross Cube (cover extended): 81.5 cu. ft.
Usable Cube (cover extended): 61.5 cu. ft.
Collapsed Cube: 28.2 cu. ft.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 1.66 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 2.19 \text{ lbs./cu. ft.}$



Fig. 2. - Assembled Container. NSRDF Neg. No. 114-25.



Fig. 3. - Collapsed Container. NSRDF Neg. No. 114-24.

C. Description: Double wall corrugated paper container, collapsible, telescoping cover, with expendable pallet.

Manufacturer: Hinde and Dauch Paper Company.

Use: Air cargo - Low and medium density.

External Dimensions (cover extended): 52" x 41-1/2" x 66"

Collapsed Dimensions (with expendable pallet): 52" x 91-1/2" x 5"

Tare Weight: 69 lbs.

Gross Cube (cover extended): 82.5 cu. ft.

Usable Cube (cover extended): 71.7 cu. ft.

Collapsed Cube (with expendable pallet): 9.1 cu. ft.

Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 0.84 \text{ lbs./cu. ft.}$

$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 0.96 \text{ lbs./cu. ft.}$

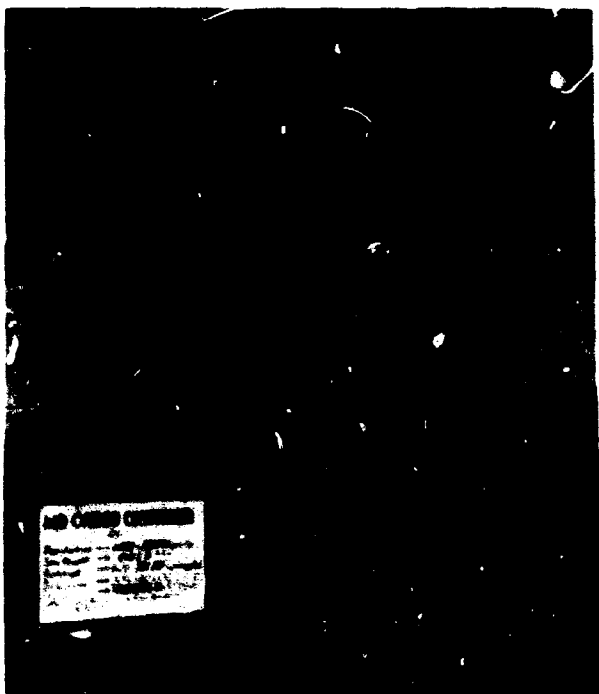


Fig. 4. - Completely Assembled Container with Cover Telescoped. NSRDP Neg. No. 114-18.



Fig. 5. - Telescoping and Container with Top Open. NSRDP Neg. No. 114-19.

D. Description:	Aluminum Pallet Box, Collapsible.
Manufacturer:	Craig Machine Inc., Danvers, Mass.
Use:	Air cargo
External Dimensions:	40" x 48" x 30"
Collapsed Dimensions:	40" x 48" x 7-5/8"
Tare Weight:	58 lbs.
Usable Cube:	28.3 cu. ft. (approx.)
Collapsed Cube:	8.45 cu. ft.
Ratios:	$\frac{\text{Tare Weight}}{\text{Gross Cube}} = 1.77 \text{ lbs./cu. ft.}$
	$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 2.05 \text{ lbs./cu. ft.}$

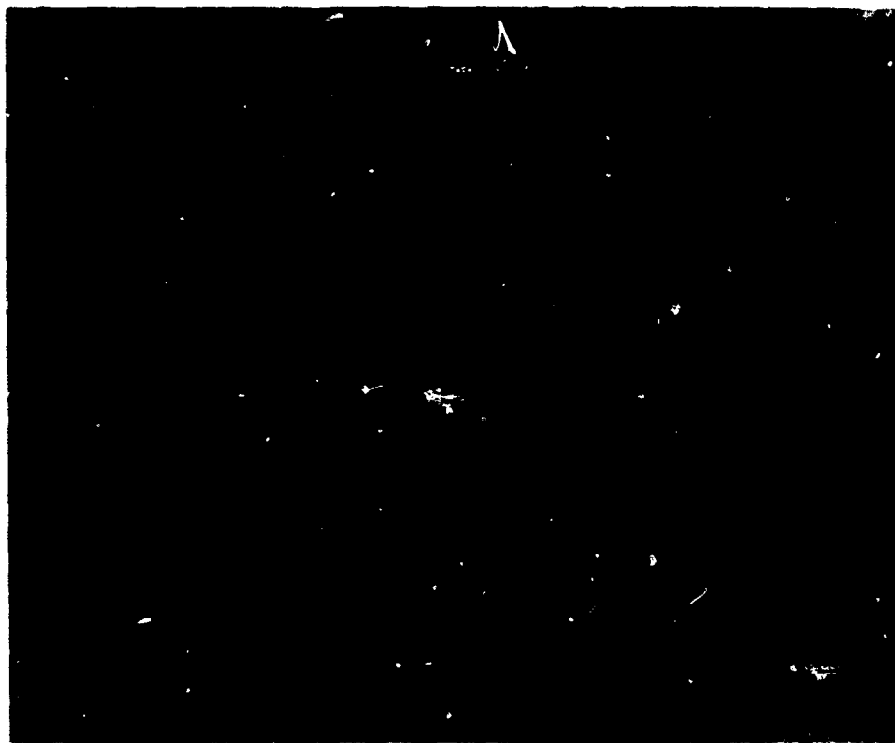


Fig. 6. - Fully Assembled Container Ready for Shipment. NSRDP Neg. No. 344-3.
(Photo courtesy of Craig Machine, Inc.)

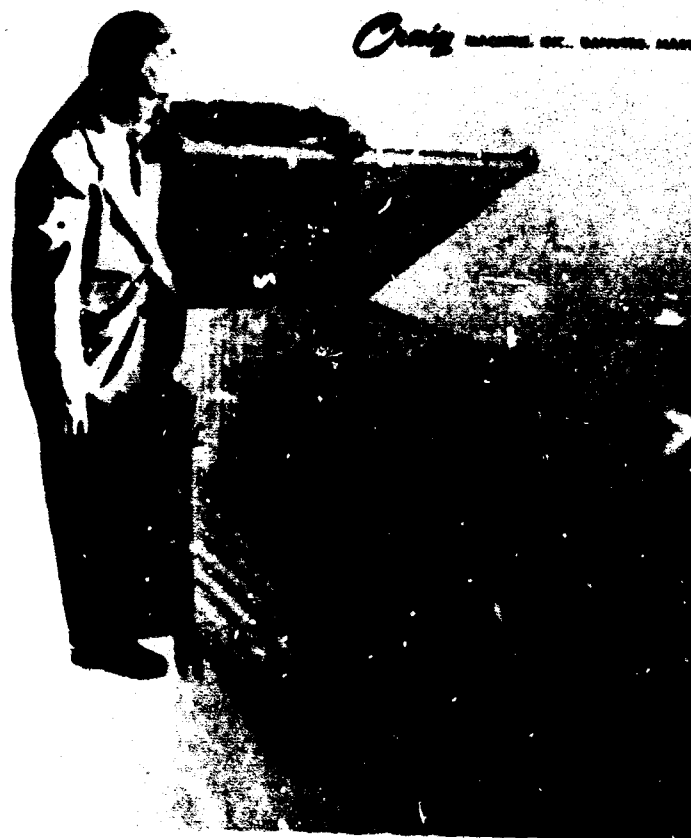


Fig. 7. - Container
Partially Assembled,
Ready for Loading.
NSRDP Neg. No. 344-1.
(Photo courtesy of
Craig Machine, Inc.)



Fig. 8. - Con-
tainer in Col-
lapsed Position.
NSRDP Neg. No.
344-2.
(Photo courtesy
of Craig Machine,
Inc.)

E. Description:	Neoprene Rubber - Collapsible Drum
Manufacturer:	U. S. Rubber Co., Providence, R. I.
Use:	Liquids and granular materials
External Dimensions:	26-1/2" dia. x 38-1/2" high
Collapsed Dimensions:	38-1/2" x 40" x 6"
Tare Weight:	38 lbs.
Gross Cube:	12.3 cu. ft.
Usable Cube:	11.2 cu. ft. (55 gallons)
Collapsed Cube:	5.34 cu. ft.
Ratios:	$\frac{\text{Tare Weight}}{\text{Gross Cube}} = 3.09 \text{ lbs./cu. ft.}$
	$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 3.39 \text{ lbs./cu. ft.}$

Note: These containers are also available in 70, 300, and 370 cu. ft.



Fig. 9. - Collapsed and Un-collapsed Drums. NSRDF Neg. No. 195-12. (Photo courtesy of U. S. Rubber Co.)



Fig. 10. - Cutaway view showing drum and construction. NSRDF Neg. No. 195-7. (Photo courtesy of U. S. Rubber Co.)

F. Description: Aluminum box, collapsible.
 Manufacturer: Zarges Leichtmetallbau, K. G. (Germany)
 Use: Air cargo - general cargo
 External Dimensions: 51" x 25" x 25"
 Collapsed Dimensions: 52" x 26" x 4"
 Tare Weight: 66 lbs.
 Usable Cube: 16.33 cu. ft.
 Collapsed Cube: 3.12 cu. ft.
 Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 3.59 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 4.05 \text{ lbs./cu. ft.}$

Note: Smaller box sizes available also.

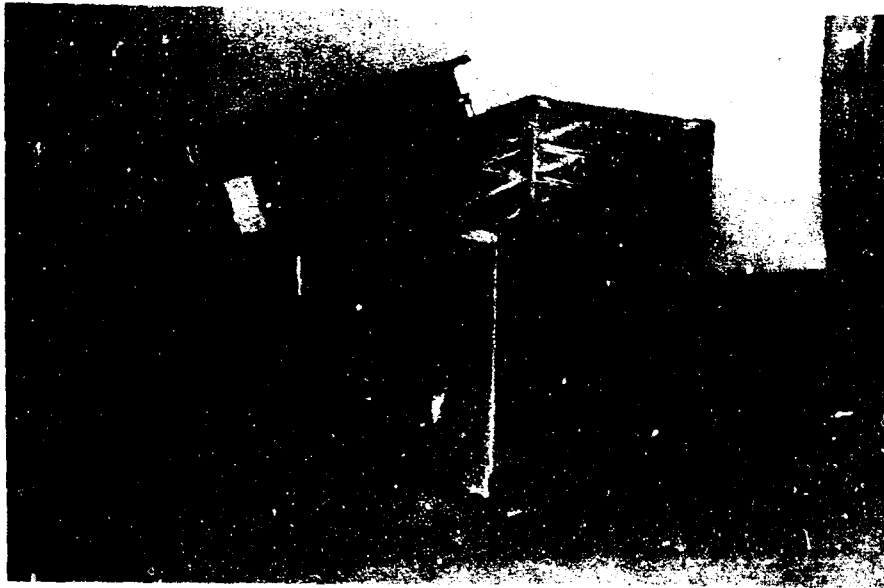


Fig. 11. - Container ready for use. NSRDF Neg. No. 208-7.

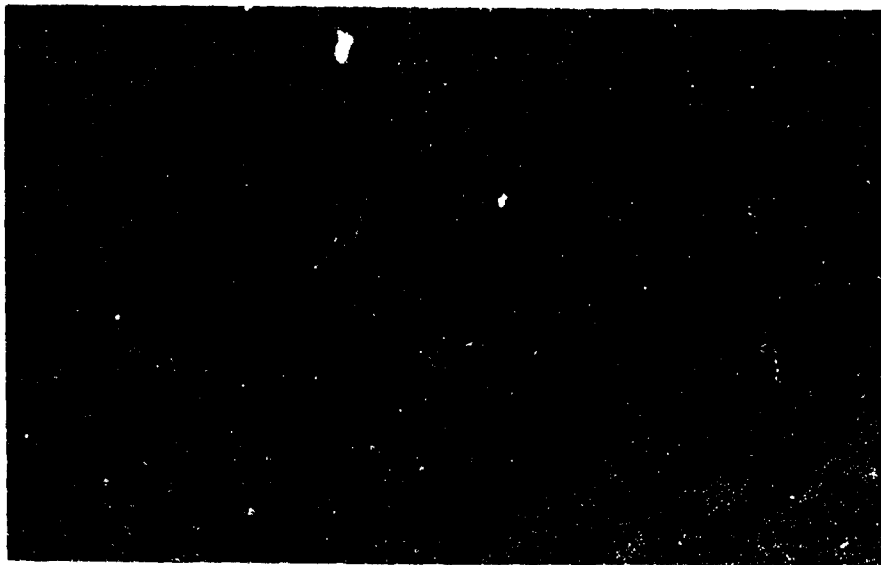


Fig. 12. - Fully collapsed container. NSRDF Neg. No. 208-5.

F. Description: Aluminum box, collapsible.

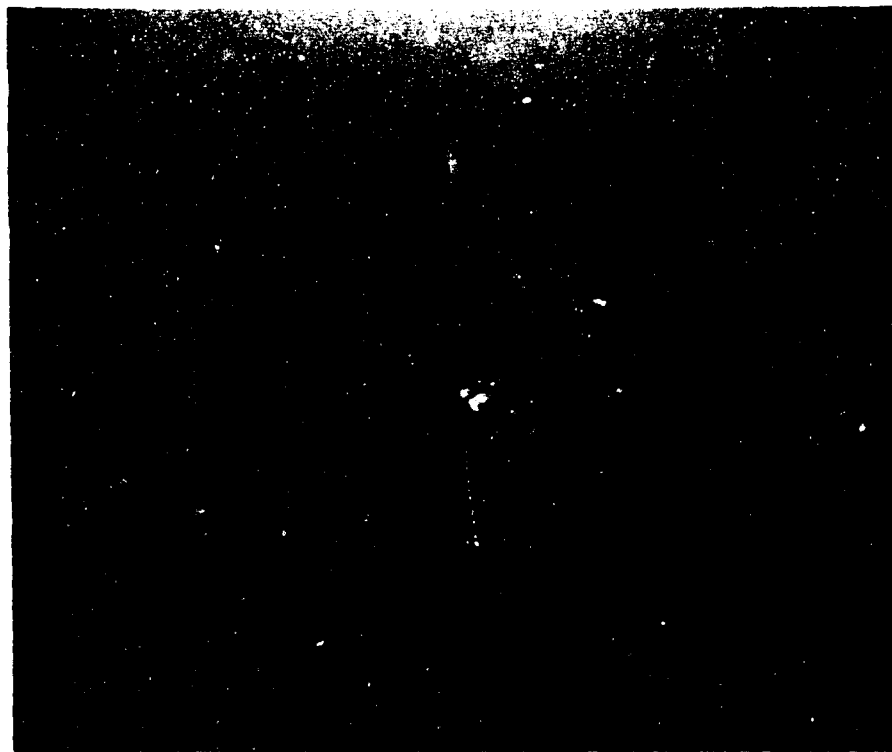


Fig. 13. - Container partially collapsed. NSRDF Neg. No. 208-1.

G. Description: Aluminum box, collapsible, lightweight,
4-way fork truck entry

Manufacturer: Kaiser Aluminum Co., Chicago, Ill.

Use: Air cargo, general cargo

External Dimensions: 48" x 40" x 40"

Collapsed Dimensions: 48" x 40" x 9-1/2"

Tare Weight: 68 lbs.

Usable Cube: 34.39 cu. ft.

Collapsed Cube: 10.56 cu. ft.

Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 1.53 \text{ lbs./cu. ft.}$

$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 1.98 \text{ lbs./cu. ft.}$

Note: Photograph of this box not currently available at USNSRDF.

GENERAL PURPOSE SHIPPING CONTAINERS

H. Description: Aluminum 248 cu. ft. shipping container,
collapsible
Manufacturer: D. C. Taylor, 402 Loman Bldg., Seattle, Wash.
Use: Household effects - low and medium density
cargo
External Dimensions: 96-1/2" x 71" x 78"
Collapsed Dimensions: 96-1/2" x 71" x 17-1/2"
Tare Weight: 535 lbs.
Gross Cube: 310 cu. ft.
Net Cube: 248 cu. ft.
Collapsed Cube: 69.5 cu. ft.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 1.73 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Net Cube}} = 2.16 \text{ lbs./cu. ft.}$

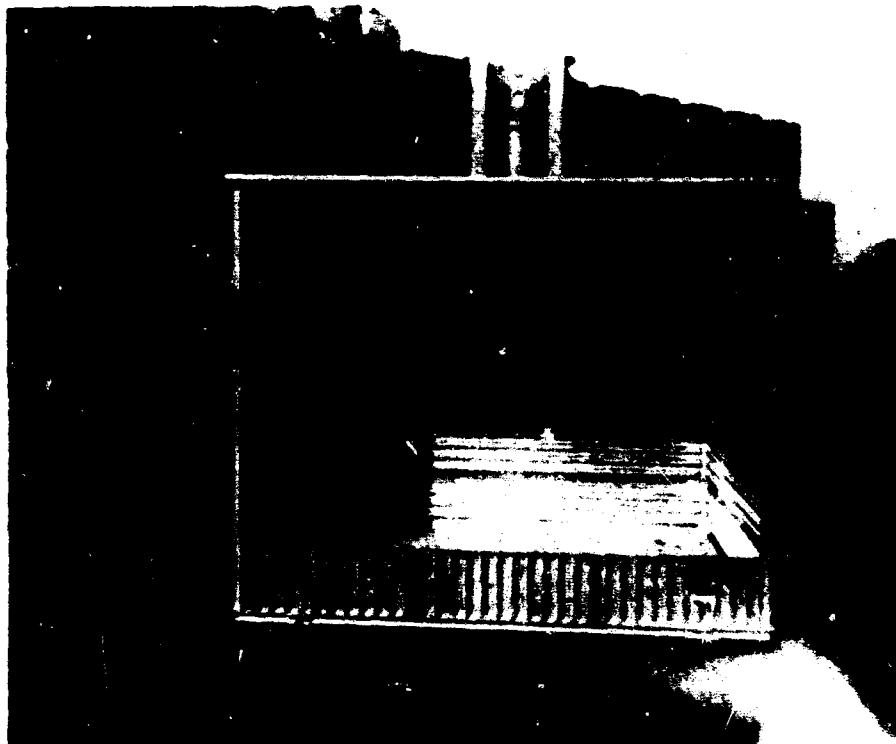


Fig. 14. - Household effects shipping container. Ready for loading.
NSRDF Neg. No. 535-8.

I. Description:	Steel shipping container, rigid
Manufacturer:	Marine Steel Corp., New York, N. Y.
Use:	General cargo up to 50 lbs./cu. ft. density
External Dimensions:	93" x 77" x 83-3/8"
Internal Dimensions:	88-3/4" x 74" x 72"
Tare Weight (estimated):	1800 lbs.
Gross Cube:	345 cu. ft.
Usable Cube:	275 cu. ft.
Capacity:	13,750 lbs.
Ratios:	$\frac{\text{Tare Weight}}{\text{Gross Cube}} = 5.22 \text{ lbs./cu. ft.}$
	$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 6.55 \text{ lbs./cu. ft.}$

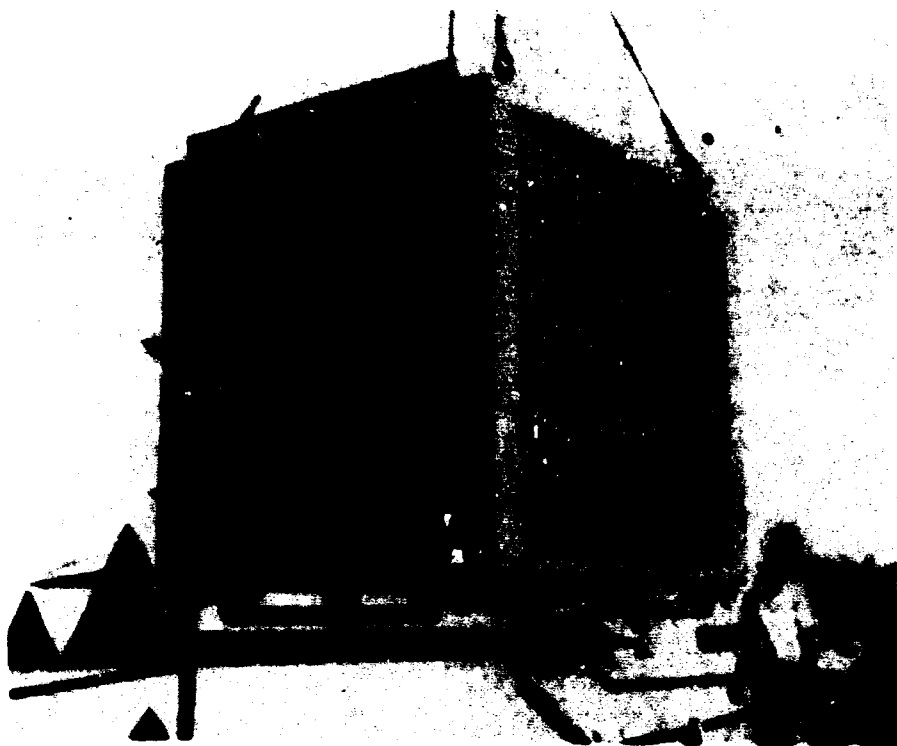


Fig. 15. - 275 cu. ft. steel shipping container. NSRDF Neg. No. 37

J. Description: Steel 200 cu. ft. shipping container
Manufacturer: Refrigeration Engineering Corp., New York, N. Y.
Use: General cargo up to 50 lbs./cu. ft. density
External Dimensions: 75" x 75" x 78"
Internal Dimensions: 70-1/2" x 72" x 68-1/2"
Tare Weight (estimated): 1280 lbs.
Gross Cube: 253 cu. ft.
Capacity: 10,000 lbs.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 5.06 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 6.4 \text{ lbs./cu. ft.}$

Note: Photograph of this container not currently available at USNSRDF.

K. Description:	Steel 150 cu. ft. shipping container
Manufacturer:	Jeta Mfg. Co., Yonkers, N. Y.
Use:	General cargo up to 50 lbs./cu. ft. density
External Dimensions:	52" x 84" x 77"
Internal Dimensions:	48" x 81-1/2" x 66-1/2"
Tare Weight (estimated):	1040 lbs.
Gross Cube:	195 cu. ft.
Capacity:	7500 lbs.
Ratios:	$\frac{\text{Tare Weight}}{\text{Gross Cube}} = 5.33 \text{ lbs./cu. ft.}$
	$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 6.9 \text{ lbs./cu. ft.}$



Fig. 16. - 150 cu. ft. steel shipping container. NSRDF Neg. No. 233-1.

L. Description: Steel 75 cu. ft. shipping container
Manufacturer: Marine Steel Corp., New York, N. Y.
Use: General cargo up to 50 lbs./cu. ft. density
External Dimensions: 51-3/4" x 60" x 52"
Internal Dimensions: 48" x 57-1/2" x 46"
Tare Weight (estimated): 615 lbs.
Gross Cube: 94 cu. ft.
Capacity: 3750 lbs.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 6.54 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 8.3 \text{ lbs./cu.ft.}$



Fig. 17. - 75 cu. ft. steel shipping container. NSRDF Neg. No. 633-5.

M. Description: Armorpely rigid container (4-way fork truck entry)
Manufacturer: Marine Steel Corp., New York, N. Y.
Use: General cargo
External Dimensions: 52-1/2" x 43" x 55"
Tare Weight: 430 lbs.
Usable Cube: 54 cu. ft.
Capacity: 2,700 lbs.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 5.98 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 7.96 \text{ lbs./cu. ft.}$



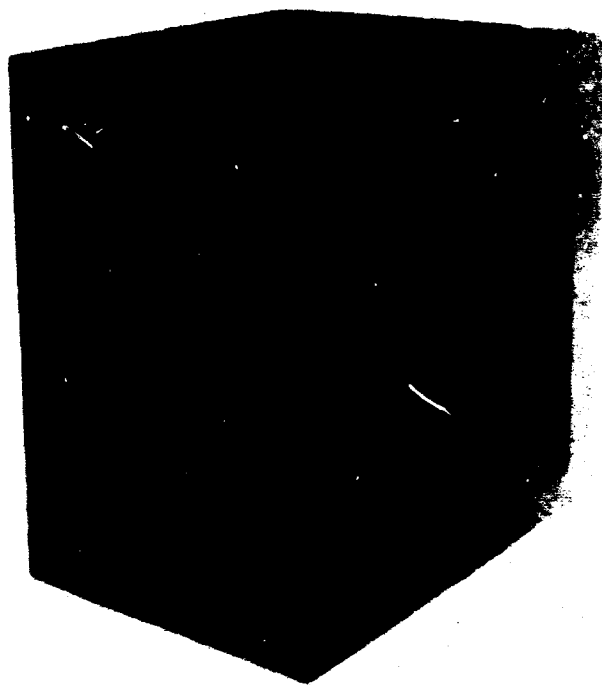
Fig. 18. - 57 cu. ft. Armorpely container. NSRDF Neg. No. 516-2.

N. Description: Steel rigid container (4-way fork truck entry)
Manufacturer: Marine Steel Corp., New York, N. Y.
Use: General cargo
External Dimensions: 48" x 60" x 52"
Tare Weight: 550 lbs.
Usable Cube: 69 cu. ft.
Capacity: 3,000 lbs.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 6.35 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 7.97 \text{ lbs./cu. ft.}$



Fig. 19. - Steel rigid cargo container. NSRDF Neg. No. 633-16.

O. Description:	Steel or light alloy, collapsible, 4-way fork truck entry
Manufacturer:	American Premaberg Co., New York, N. Y.
Use:	As is, general cargo; with liner, liquids and granular materials
External Dimensions:	63" x 48" x 72"
Collapsed Dimensions:	105" x 61" x 13"
Tare Weight:	924 lbs. (steel) and 441 lbs. (light alloy)
Usable Cube:	92 cu. ft.
Collapsed Cube:	48 cu. ft.
Capacity:	8,000 - 10,000 lbs.
Ratios:	$\frac{\text{Tare Weight}}{\text{Gross Cube}} = 7.33 \text{ lbs./cu. ft. (steel)}$
	$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 10.04 \text{ lbs./cu. ft. (steel)}$



(Photos courtesy of
American Premaberg Co.)

Fig. 20. - Fully closed container. NSRDF Neg. No. 195-16.

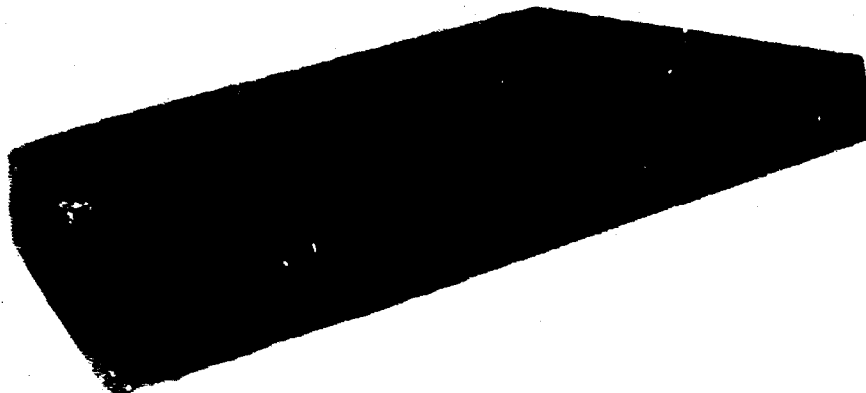


Fig. 21. - Fully collapsed container. NSRDF Neg. No. 195-8.

P. Description: Cargo Container, wood, steel frame, collapsible
 Manufacturer: Safe-Gard Container, Seattle, Washington
 Use: General cargo
 External Dimensions: 34" x 48" x 56"
 Collapsed Dimensions: 84" x 48" x 14"
 Tare Weight: 455 lbs.
 Usable Cube: 100 cu. ft.
 Collapsed Cube: 32.7 cu. ft.
 Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 3.48 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 4.55 \text{ lbs./cu. ft.}$

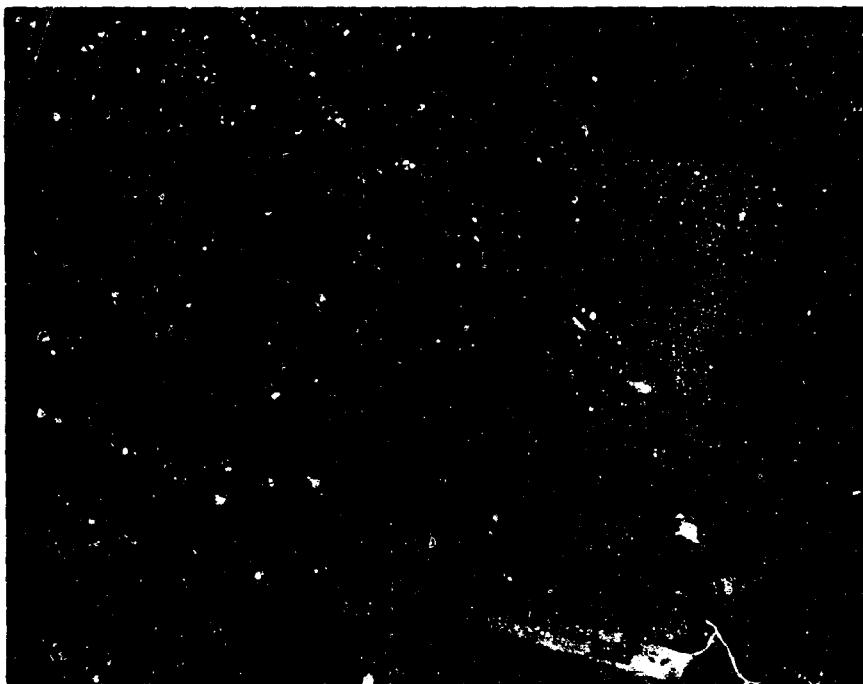


Fig. 22. - Assembled container with lid removed. NSRDF Neg. No. 195-1. (Photo courtesy of Safe-Gard Container)



Fig. 23. - Container being loaded through opened end. NSRDF Neg. No. 195-3. (Photo courtesy of Safe-Gard Container)

P. Description: Cargo Container, wood, steel frame, collapsible

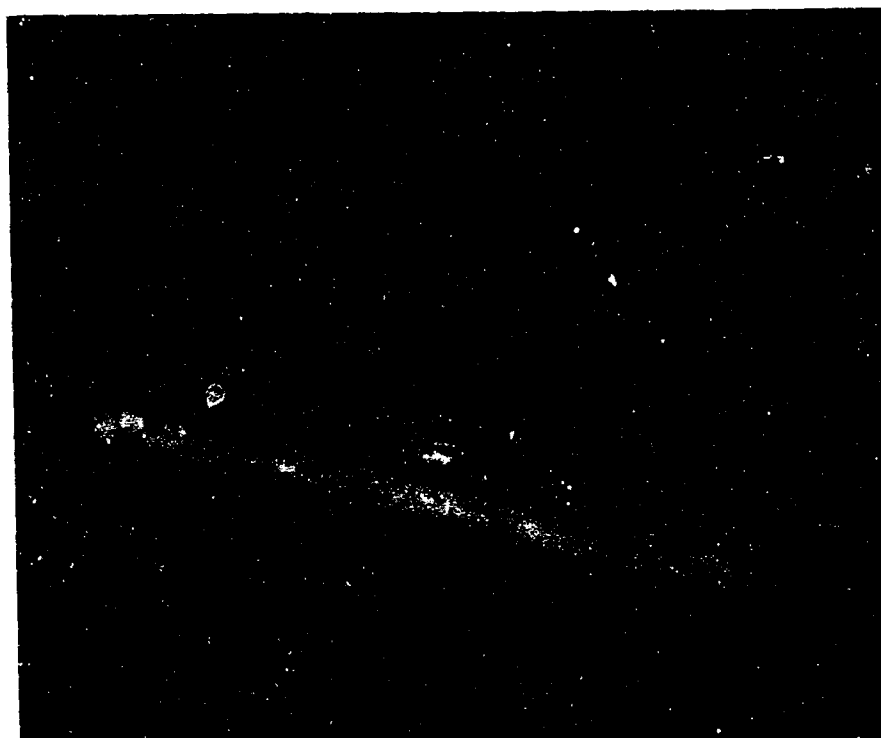


Fig. 24. - Fully collapsed container. NSRDF Neg. No. 195-2.
(Photo courtesy of Safe-Gard Container)

Q. Description: Cargo container, wood, steel frame, rigid
Manufacturer: Wood Fabricating Co., Portland, Oregon
Use: General cargo
External Dimensions: 74" x 50" x 78"
Tare Weight: 715 lbs.
Usable Cube: 144 cu. ft.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 4.28 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 4.97 \text{ lbs./cu. ft.}$

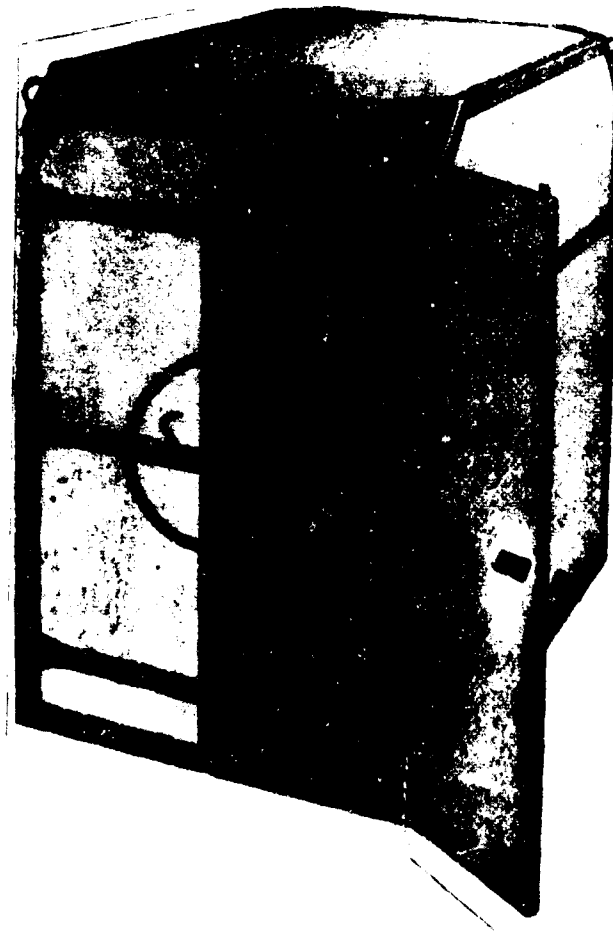


Fig. 25. - Container partially opened. NSRDF Neg. No. 195-15.
(Photo courtesy of Wood Fabricating Co.)

TOTE BOXES AND BINS

Tote boxes and bins have limited uses. They are generally used for intra-depot movement of small parts or packages. Since these containers are not equipped with lids, their use for domestic truck or rail shipments is limited as special handling is required. Some typical examples of these containers are listed as follows:

R. Description:	Steel bin, collapsible, tierable, 2-way fork truck entry
Manufacturer:	Republic Steel Corporation
Use:	Small, heavy items
External Dimensions:	30" x 30" x 34-1/2"
Collapsed Dimensions:	30" x 30" x 7"
Usable Cube:	14.6 cu. ft.
Collapsed Cube:	3.65 cu. ft.
Tare Weight:	140 lbs. (estimated)
Ratios:	$\frac{\text{Tare Weight}}{\text{Gross Cube}} = 7.79 \text{ lbs./cu. ft.}$
	$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 9.59 \text{ lbs./cu. ft.}$

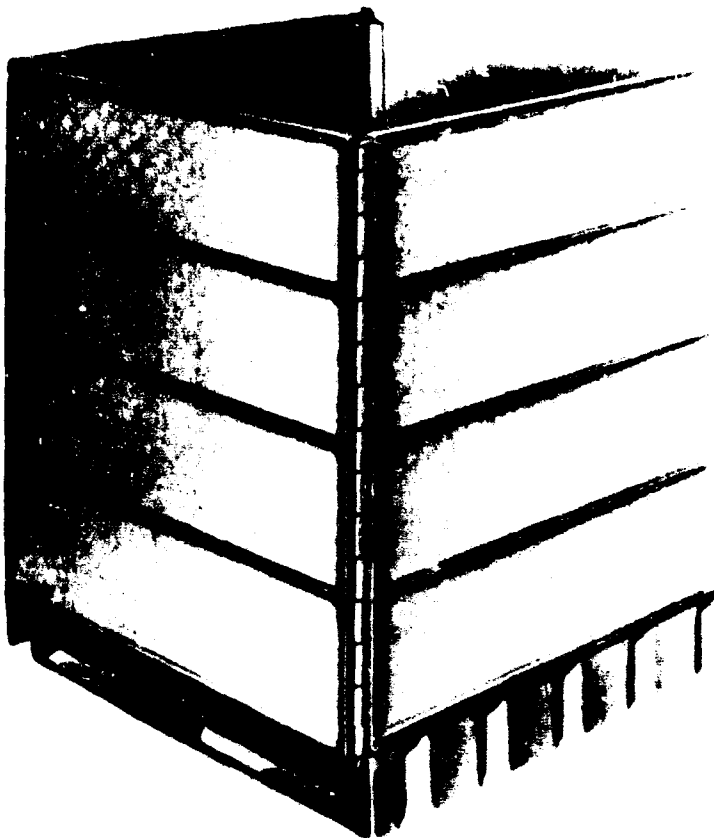


Fig. 26. - Fully assembled bin.
NSRDF Neg. No. 195-9.
(Photo courtesy of Republic
Steel Corp.)

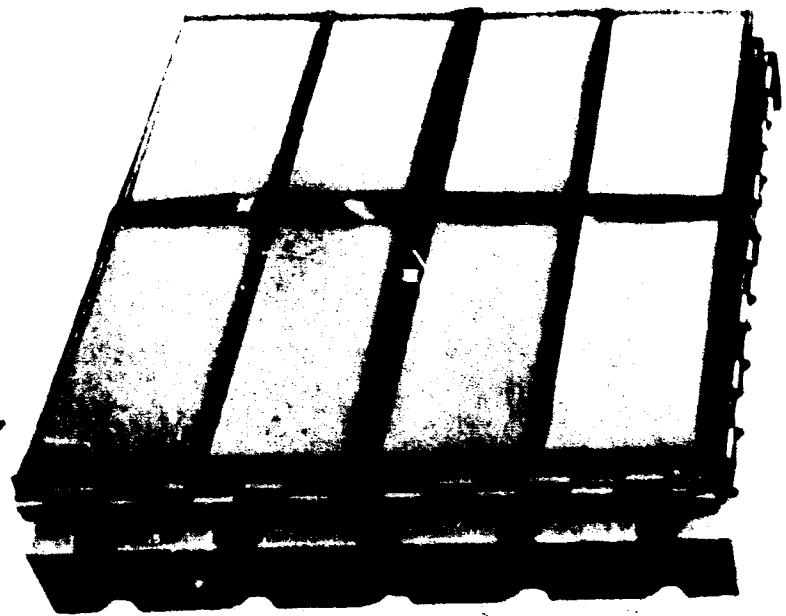


Fig. 27. - Fully collapsed bin.
NSRDF Neg. No. 195-6.
(Photo courtesy of Republic
Steel Corp.)

S. Description: Steel bin, collapsible, 4-way fork truck entry.

Manufacturer: Mechanical Handling Systems, Inc., Chicago, Ill.

Use: Small, heavy items

External Dimensions: 60-1/2" x 36-1/2" x 40-3/4"

Collapsed Dimensions: 60-1/2" x 36-1/2" x 19-3/4"

Usable Cube: 28.3 cu. ft.

Collapsed Cube: 25.2 cu. ft.

Tare Weight: 500 lbs.

Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 9.62 \text{ lbs./cu. ft.}$

$\frac{\text{Tare Weight}}{\text{Usable Cube}} = 17.67 \text{ lbs./cu. ft.}$

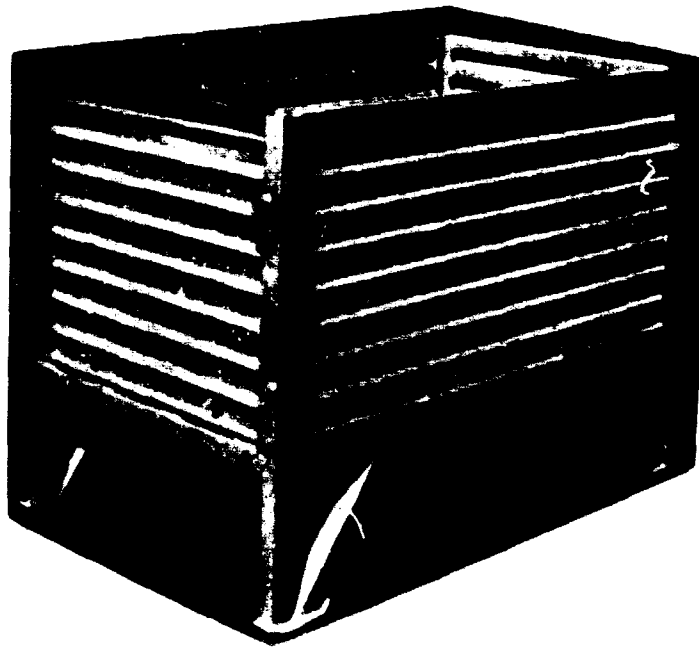


Fig. 28. - Assembled steel bin. NSRDF Neg. No. 195-11. (Photo courtesy of Mechanical Handling Systems, Inc.)



Fig. 29. - Collapsed steel bin, illustrating tiering qualities. NSRDF Neg. No. 195-14. (Photo courtesy of Mechanical Handling Systems, Inc.)

T. Description:	Steel wire bin, basket type, collapsible, 4-way fork truck entry
Manufacturer:	1. Rack Engineering Co., Connellsville, Pa. 2. Pittsburgh Steel Products, Pittsburgh, Pa.
Use:	General cargo and granular materials (with liner)
External Dimensions:	40" x 48" x 29-1/4" (Pittsburgh Steel Products)
Collapsed Dimensions:	40" x 48" x 7-1/2"
Tare Weight:	147 lbs.
Usable Cube:	25 cu. ft.
Collapsed Cube:	8.3 cu. ft.
Ratios:	$\frac{\text{Tare Weight}}{\text{Gross Cube}} = 4.52 \text{ lbs./cu. ft.}$ $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 5.88 \text{ lbs./cu. ft.}$

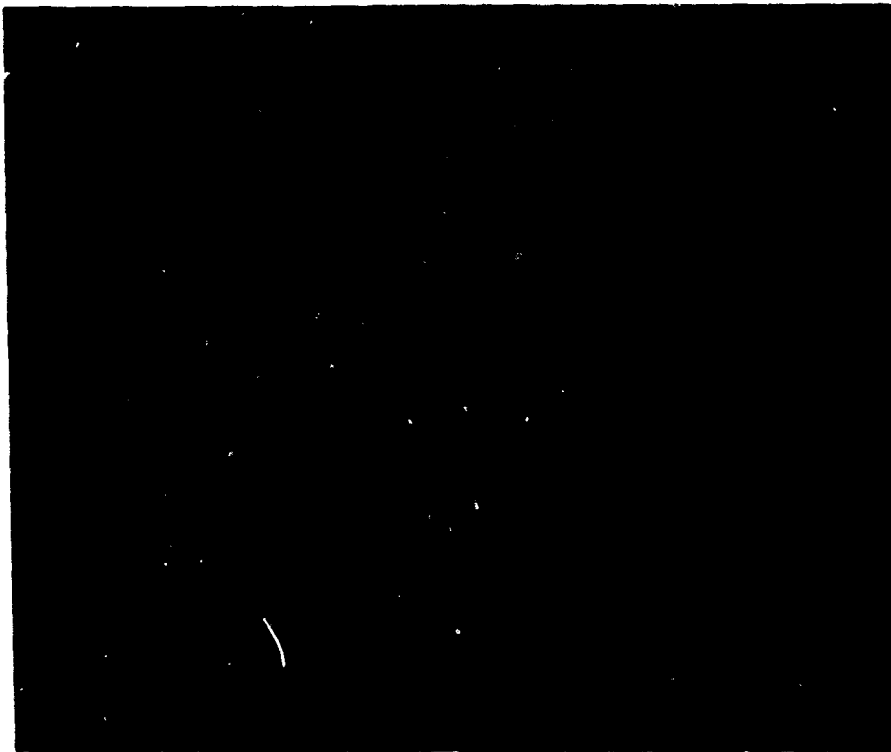


Fig. 50. - Typical steel wire bin. NSRDF Neg. No. 194-1.

U. Description:	Wood tote box, steel reinforced, collapsible, tierable, 2-way fork truck entry
Manufacturer:	G. B. Lewis Co., Watertown, Wisconsin
Use:	Small parts
External Dimensions:	48" x 28" x 34" (various other sizes available)
Collapsed Dimensions:	48" x 28" x 11"
Tare Weight:	120 lbs.(estimated)
Usable Cube:	19.3 cu. ft.
Collapsed Cube:	8.6 cu. ft.
Ratios:	$\frac{\text{Tare Weight}}{\text{Gross Cube}} = 4.54 \text{ lbs./cu. ft.}$ $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 6.22 \text{ lbs./cu. ft.}$

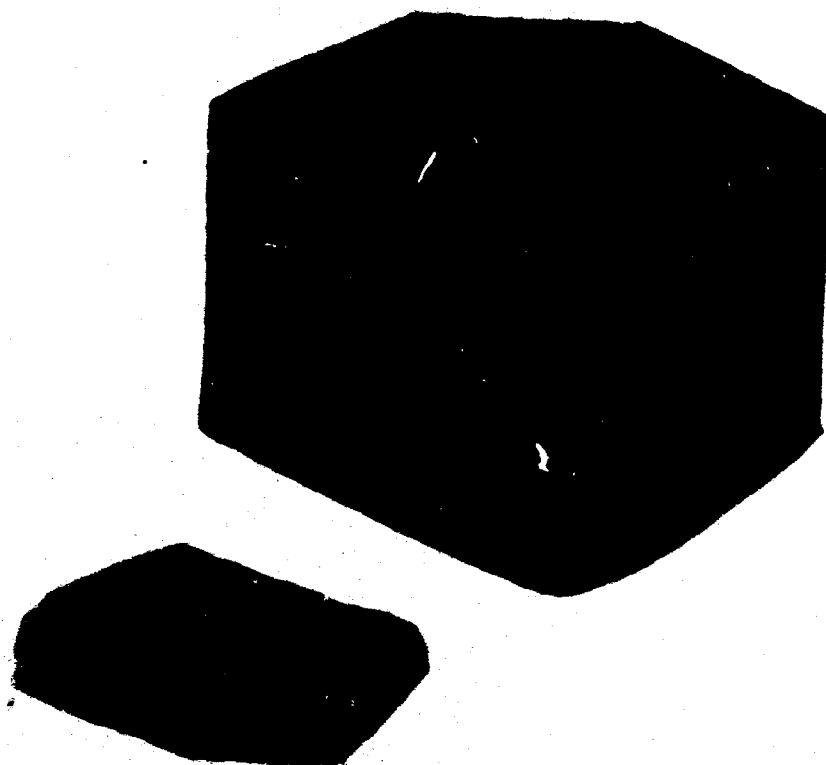


Fig. 31. - Assembled and collapsed pallet equipped wood box. NSRDF
 Neg. No. 195-5. (Photo courtesy of G. B. Lewis Co.)

V. Description: Vulcanized fiber rigid tote box (steel reinforced corners) - skid equipped
Manufacturer: William Bal Corp., Newark, N. J.
Use: Small parts and low density cargo
External Dimensions: 48" x 36" x 36"
Tare Weight: 45 lbs. (approx.)
Usable Cube: 32 cu. ft.
Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 1.25 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Usable Cube}} = 1.41 \text{ lbs./cu. ft.}$

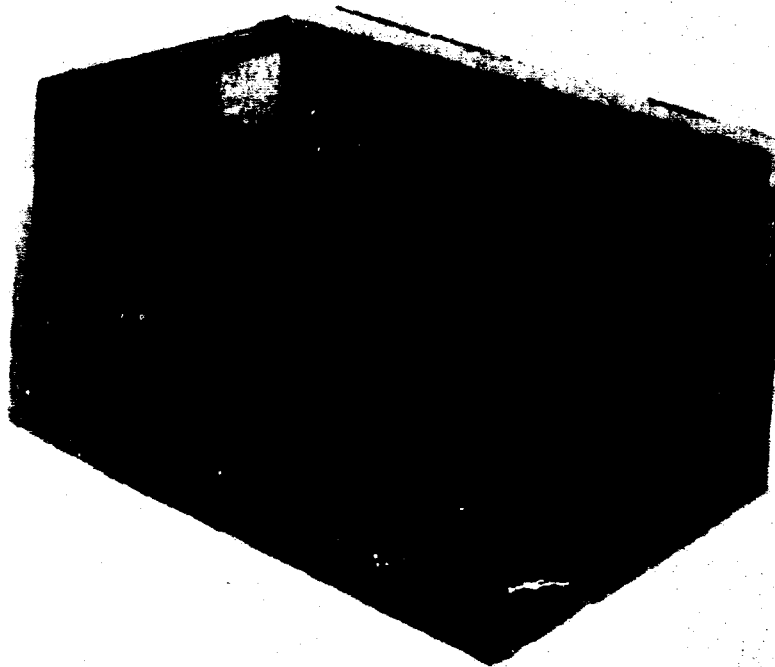


Fig. 32. - Vulcanized fiber tote box, skid equipped. NSRDF Neg. No. 195-10. (Photo courtesy of William Bal Corp.)

W. Description: Aluminum tote box, collapsible
 Manufacturer: Hamlin Metal Products, Akron, Ohio
 Use: Air Cargo and small parts
 External Dimensions: 40" x 48" x 21-11/16"
 Collapsed Dimensions: 40" x 48" x 6"
 Tare Weight: 150 lbs. (approx.)
 Usable Cube: 23 cu. ft.
 Collapsed Cube: 6.7 cu. ft.
 Ratios: $\frac{\text{Tare Weight}}{\text{Gross Cube}} = 6.21 \text{ lbs./cu. ft.}$
 $\frac{\text{Tare Weight}}{\text{Net Cube}} = 6.52 \text{ lbs./cu. ft.}$

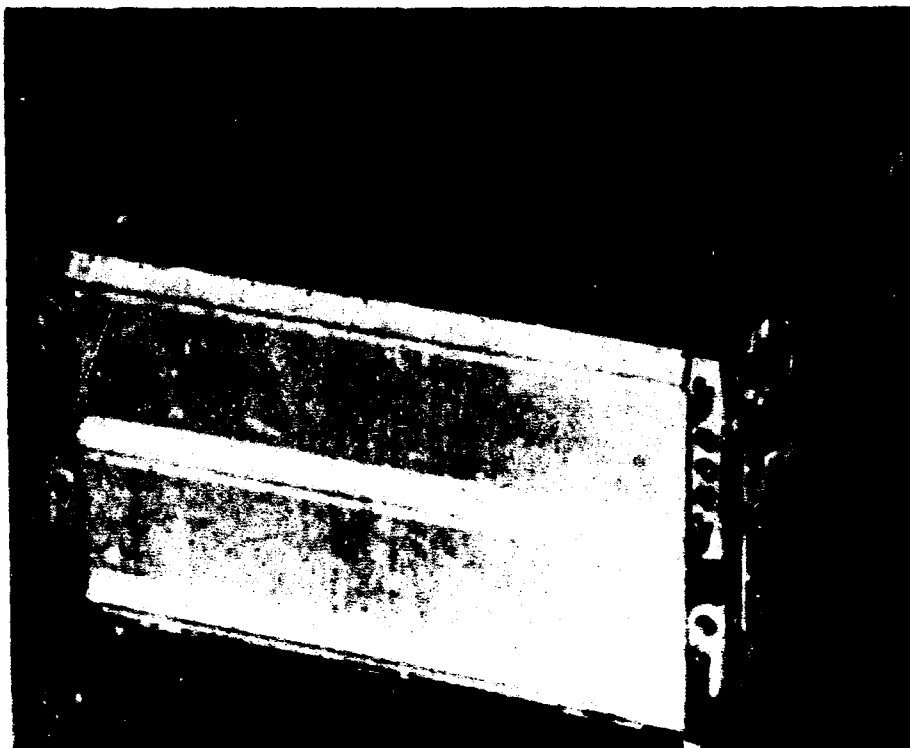


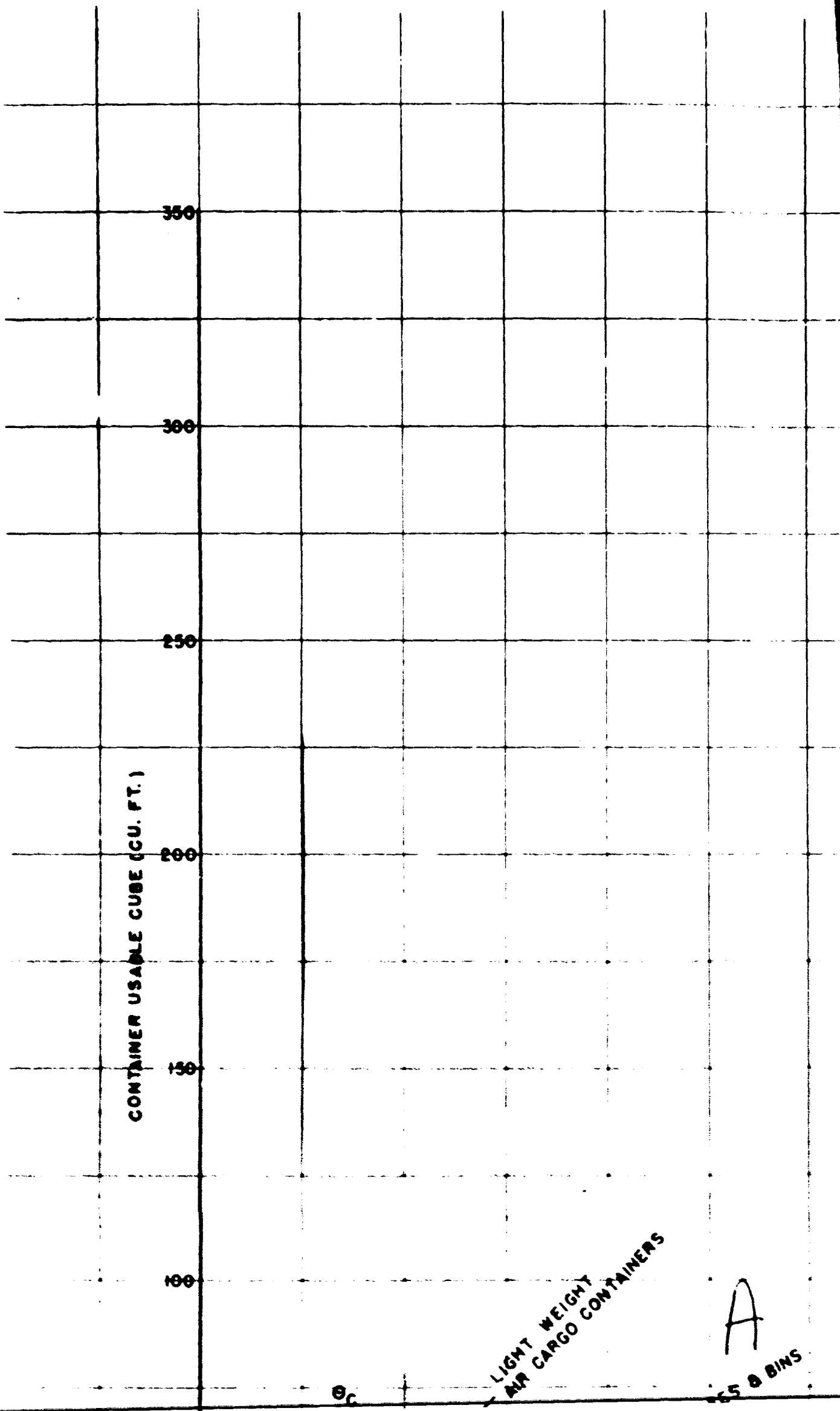
Fig. 33. - Fully
 assembled aluminum
 tote box. NSRDF
 Neg. No. 642-4.



Fig. 34. - Fully
 collapsed tote box.
 NSRDF Neg. No. 642-1.

REUSABLE CONTAINERS

<u>Container No.</u>	<u>Cube (cu. ft.)</u>		<u>Tare Weight (lbs.)</u>	<u>Ratio: Tare Weight Usable Cube (lbs./cu. ft.)</u>	<u>Material</u>	<u>Report Page No.</u>
	<u>Gross</u>	<u>Usable</u>				
A	52.7	43.3	83	1.92	Aluminum faced	1
B	81.5	61.5	135	2.19	honeycomb	
C	82.5	71.7	69	0.96	Paper faced	2
D	33.3	28.3	58		honeycomb	
E	13.7	11.2	38	2.05	D.W. corrugated	3
F	18.4	16.3	66	3.39	paper	
G	44.4	34.4	68	4.05	Aluminum Pallet Box	4
H	310.0	248.0	535	1.98	Rubber drum	6
I	345.0	275.0	1,800	2.16	Aluminum box	7
J	253.0	200.0	1,280		Aluminum box	9
K	195.0	151.0	1,040		Household effects	10
L	94.0	75.0	615	6.55	container	
M	71.7	54.0	430	6.40	Steel shipping	11
N	86.6	69.0	550	6.40	container	
O-1	126.0	92.0	441	6.90	Steel shipping	12
O-2	126.0	92.0	924	6.90	container	
P	130.7	100.0	455	4.79	Steel shipping	13
Q	167.0	144.0	715	4.55	container	
R	18.0	14.6	140	4.97	Steel shipping	14
S	52.0	28.3	500	9.59	container	
T	32.5	25.0	147	17.67	Steel shipping	15
U	26.5	19.3	120	5.88	container	
V	36.0	32.0	45	6.22	Armorply rigid	16
W	24.2	23.0	150	1.41	container	
				6.52	Steel rigid	17
					Light alloy	17
					Steel	17
					Wood, steel frame	18
					Wood, steel frame	20
					Steel bin	21
					Steel bin	22
					Steel wire bin	23
					Wooden box	24
					Vulcanized fiber,	25
					rigid	
					Aluminum tote box	26



CONTAINER USABLE CUBE (CU. FT.)

350

300

250

200

150

100

ec

LIGHT WEIGHT
AIR CARGO CONTAINERS

A

55 & BINS

REUSABLE CONTAINERS

CONTAINER TARE WT. VS. CONTAINER USABLE CUBE

LEGEND

- ▣ STEEL SHIPPING CONTAINERS
- LIGHT WEIGHT AIR CARGO CONTAINERS
- △ LIGHT ALLOY OR WOOD SHIPPING CONTAINERS
- ▽ STEEL OR WIRE BIN
- ◇ MISCELLANEOUS TOTE BOXES & BINS

▣
H

LIGHT ALL
SHIPPING
○

B

△P

△O

▣
L

○
H

CONTAINERS

INNER USABLE CUBE

SEND

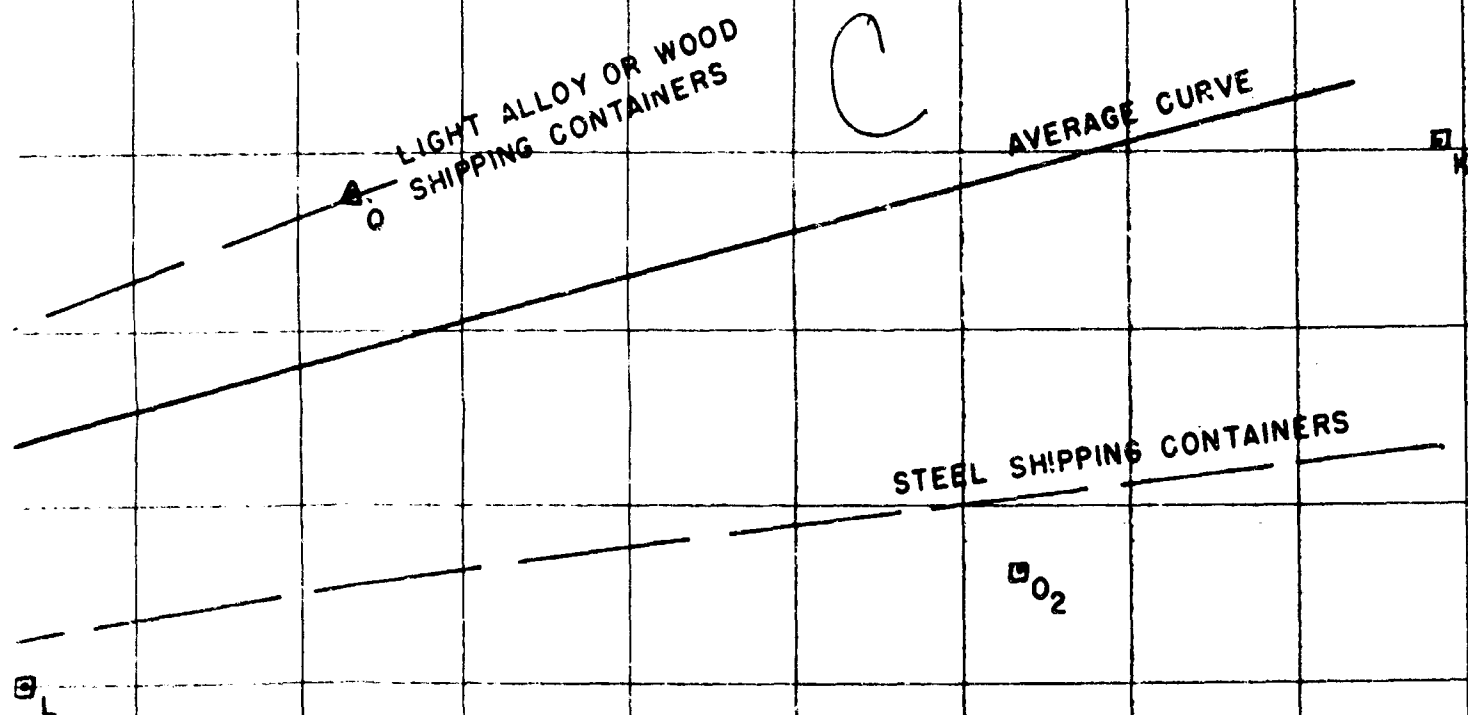
SHIPPING CONTAINERS

WEIGHT AIR CARGO CONTAINERS

ALLOY OR WOOD SHIPPING CONTAINERS

OR WIRE BIN

DIVANEOUS TOTE BOXES & BINS



CONTAINER USABLE CUBE (CU. FT.)

200

150

100

50

0

V

D

G

F

E

A

U

R

T

W

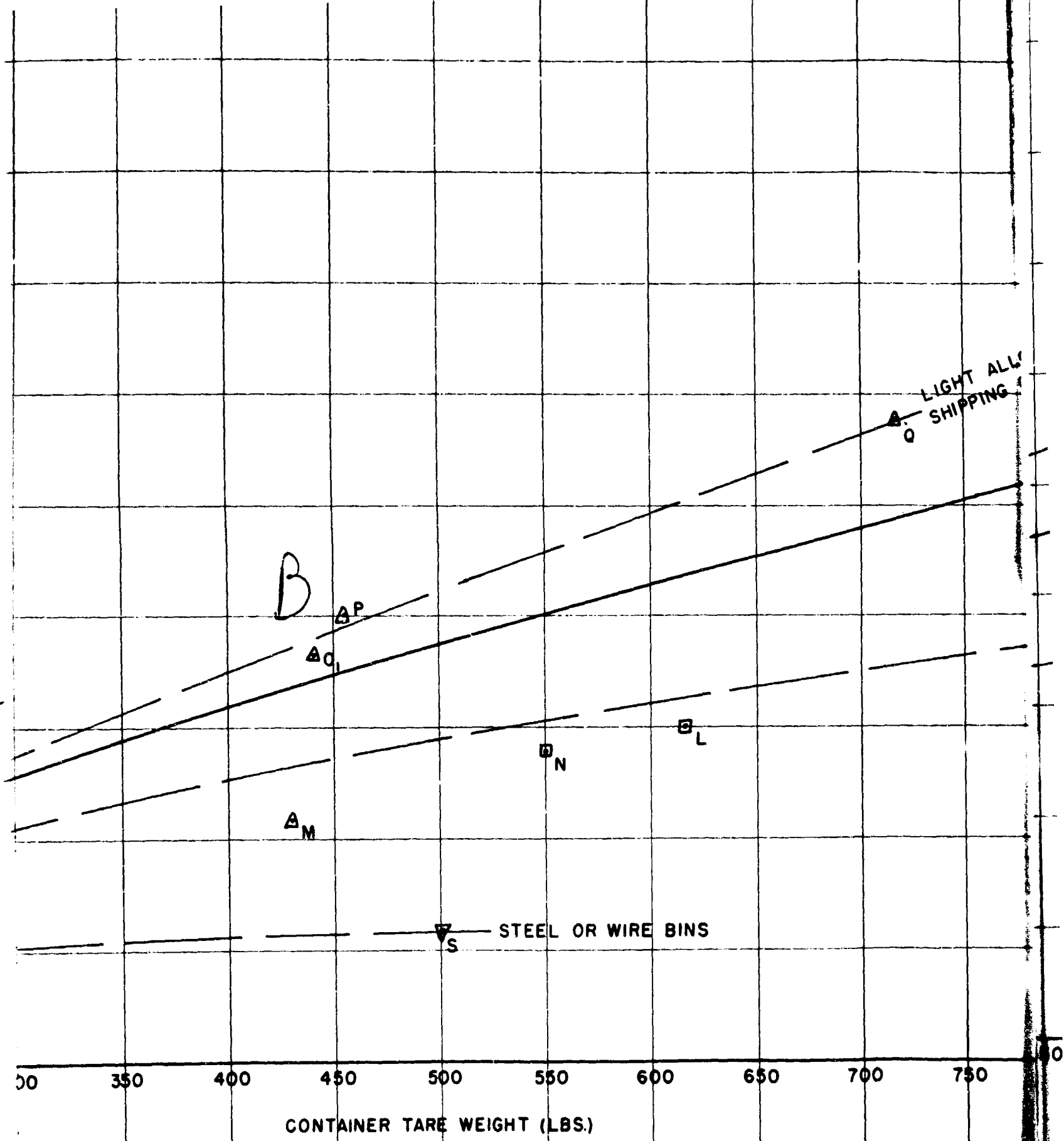
B

C

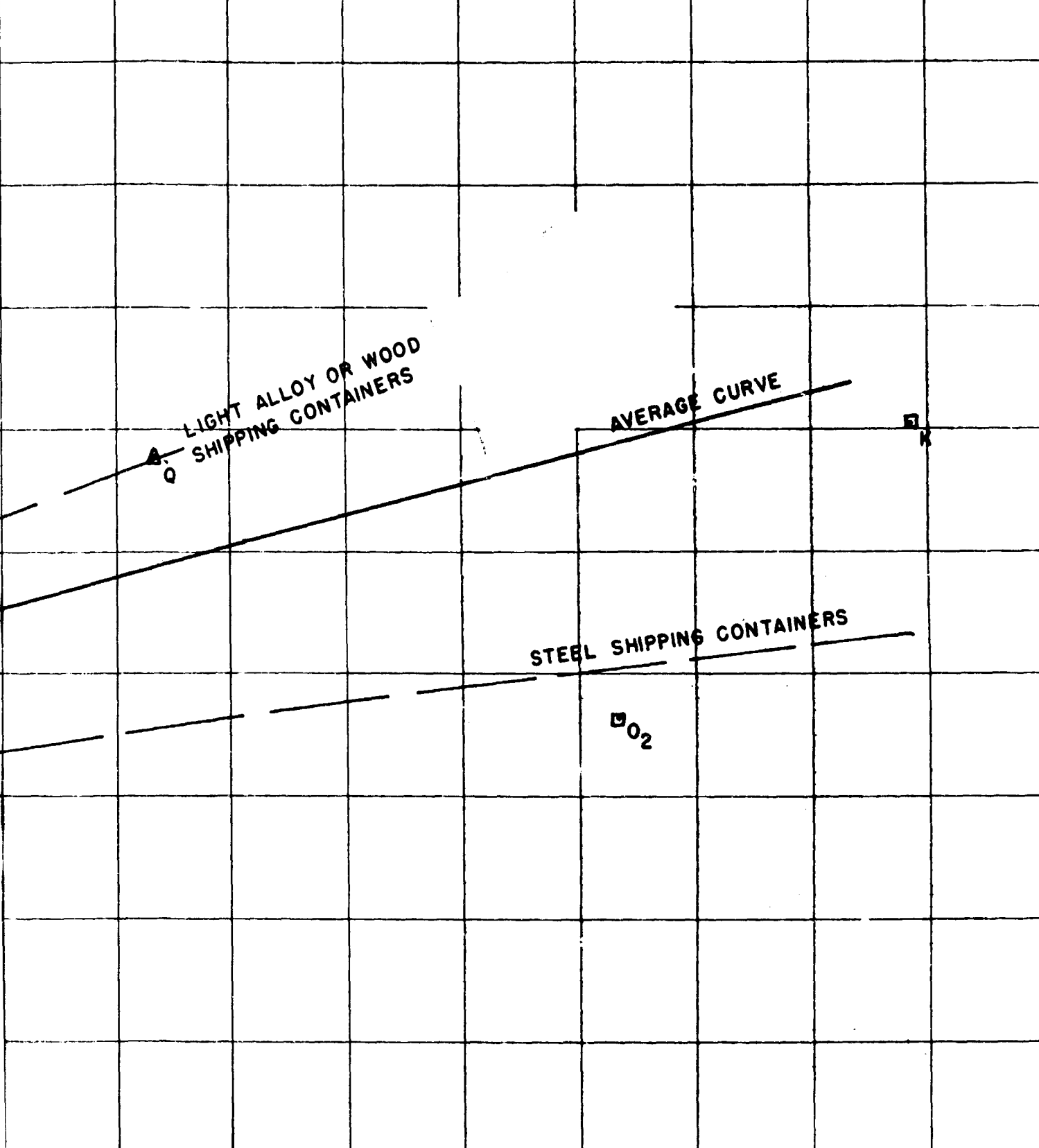
LIGHT WEIGHT
AIR CARGO CONTAINERS

MISCELLANEOUS TOTE BOXES & BINS

D



E



0 700 750 800 850 900 950 1000 1050

U.S. NAVAL SUPPLY RESEARCH AND DEVELOPMENT FACILITY BATONNE, N. J.	
SUPPLY ENGINEERING DIVISION	
DRAWN BY: <u>RLR</u>	APPROVED: <u>RLR</u>
DATE: <u>10-10-55</u>	DWG. NO. <u>SED-SK-580</u>

F

A

350

300

250

CONTAINER GROSS CUBE (CU. FT.)

200

150

100

⊙_C

⊙_B

LIGHT WEIGHT
AIR CARGO CONTAINERS

TOTE
BINS

REUSABLE CONTAINERS

CONTAINER TARE WEIGHT VS. CONTAINER GROSS CUBE

B

□_H

LEG

- STEEL SHIPPING CON
- LIGHT WEIGHT AIR C
- △ LIGHT ALLOY OR WO
- ▽ STEEL OR WIRE BIN
- ◇ MISCELLANEOUS TO

LIGHT ALLOY
SHIPPING

△_O

△_O △_P

□_L

□_N

△_M

ANS

AINERS

TAINER GROSS CUBE

C

LEGEND

- ▣ STEEL SHIPPING CONTAINER
- ⊙ LIGHT WEIGHT AIR CARGO CONTAINERS
- △ LIGHT ALLOY OR WOOD SHIPPING CONTAINERS
- ▽ STEEL OR WIRE BIN
- ◇ MISCELLANEOUS TOTE BOXES & BINS

LIGHT ALLOY OR WOOD
SHIPPING CONTAINERS

△₀

AVERAGE CURVE
STEEL SHIPPING CONTAINERS

▣₀₂

▣₁

CONTAINER GROSS CUBE (CU. FT.)

250

200

150

100

50

0

50

100

150

200

250

300

350

400

LIGHT WEIGHT
AIR CARGO CONTAINERS

MISC. TOTE
BOXES & BINS

⊙C

⊙B

⊙A

⊙G

⊙D

⊙F

⊙E

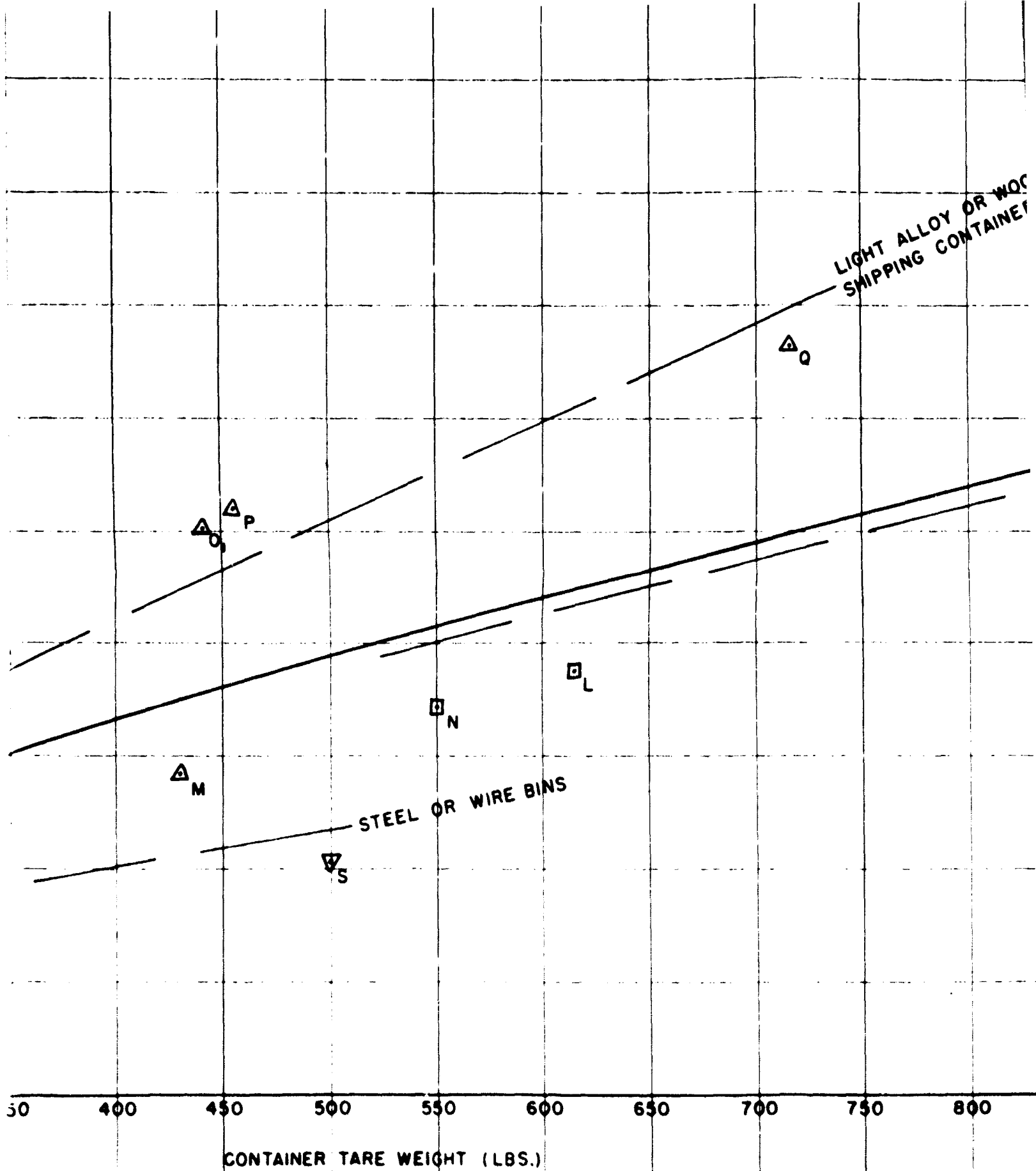
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D



E

LIGHT ALLOY OR WOOD
SHIPPING CONTAINERS

Δ_0

AVERAGE CURVE

STEEL SHIPPING CONTAINERS

Δ_0

Δ_0

700 750 800 850 900 950 1000 1050

U S NAVAL SUPPLY RESEARCH AND DEVELOPMENT FACILITY BAYONNE, N. J.	
SUPPLY ENGINEERING DIVISION	
DRAWN BY <u>RJR</u>	APPROVED <u>[Signature]</u>
DATE <u>10-10-53</u>	DWG. NO. <u>SED-SX-581</u>

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